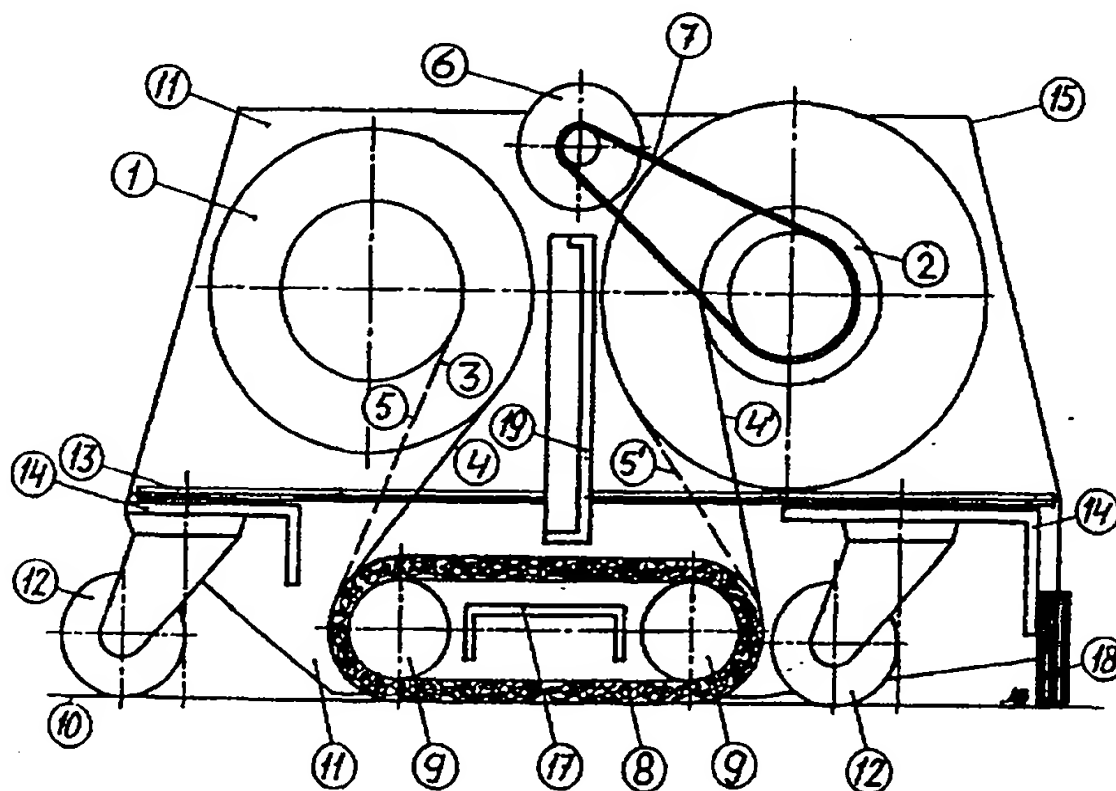




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/NL91/00010 <b>(22) International Filing Date:</b> 24 January 1991 (24.01.91) <b>(30) Priority data:</b> 9000184                      24 January 1990 (24.01.90)      NL  <b>(71) Applicant (for all designated States except US):</b> REINHOUD B.V. [NL/NL]; Achtersloot 83, NL-3401 NT IJsselstein (NL). <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only) :</b> BIERMA, Ulrik, Folkert [NL/NL]; Achtersloot 83, NL-3401 NT IJsselstein (NL). BOTH, Dirk, Maarten [NL/NL]; Graanakker 45, NL-2743 EM Waddinxveen (NL).  <b>(74) Agent:</b> RHIJNSBURGER, Johan, Gerard; De Lange Krag 36, NL-2811 RX Reeuwijk (NL).		<b>(81) Designated States:</b> AT (European patent), AU, BE (European patent), BR, CA, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FI, FR (European patent), GB (European patent), GR (European patent), HU, IT (European patent), JP, KR, LU (European patent), NL (European patent), NO, PL, SE (European patent), SU, US.  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> <i>In English translation (filed in Dutch).</i>

**(54) Title:** MOPSWEEPING APPARATUS WITH CONTINUOUS ACTION**(57) Abstract**

A mopsweeping apparatus comprising a movable housing (15) wherein a drivable cooperating roller pair is incorporated, on one roller (1) of which is wound a supply of dust binding cloth (3) and on the other (2) of which the cloth is windable, between both rollers a pressing means is arranged, under which the cloth (3) during movement is held on the floor. In the figure an embodiment is shown.

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MOPSWEeping APPARATUS WITH CONTINUOUS ACTION

The present invention relates to a mopsweeping apparatus for periodically or daily removal of dust and dirt particles from solid floor coverings, comprising a dust binding cloth which is moved on the floor to be cleaned.

5        There are several mopsweeping apparatuses known to remove dust from the floor and which contain disposable cloths. If after some time the cloth is saturated with dust and dirt it is exchanged for a clean impregnated cloth. Thus it is necessary in this stepwise system to exchange the cloths after fixed times which is time consuming. Further-  
10 more, the moment of exchange is rather subjective. It is possible that the cloth is used too long a time and thus the desirable degree of cleaning is not obtained.

The invention is now directed to a continuous mopsweeping apparatus wherein the cloth without interaction from outside is conti-  
15 nuously renewed and a more regular dust and dirt removal is obtained. In this way the numerous stopping moments needed in the old system to replace the cloth are abandoned.

Thus the invention provides a mopsweeping apparatus comprising a dirt receiving cloth which is moved over the floor to be cleaned,  
20 which is characterized, in that it comprises a manually or a motor driven movable frame wherein a driven cooperating pair of rollers is present, on the one roller of which a supply of cloth is wound and on the other roller of which the cloth, when driven, is windable and between which a pressing means is provided, under which the cloth is  
25 retained during movement on the floor. The roller pair is preferably motor driven and preferably the take-up roller is driven. The driving preferably takes place so that the winding direction of the cloth runs in the same direction as the movement of the total apparatus in contact with the floor. Preferably the winding velocity of the cloth is  
30 substantially lower than the movement velocity of the apparatus, which amounts to about a slow walking velocity of about 3-4 km/hour. A favourable value of the cloth velocity is generally in the range of 2-15 m/hour, with preference for values of 3-10 m/hour, especially 3-6 m/hour. By choosing the winding direction and the movement direction in  
35 the same sense, the backside of the apparatus always contains a clean cloth while the dirty part is present at the frontside. This is favour-

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nable for removal of dirt. Further the collection of coarser dirt particles (such as stamps, paper balls, plastic cups, etc.) which assemble at the frontside and could damage the cloth, is facilitated. For this purpose preferably at the frontside a catching means is  
5 arranged, for example a strip, bent in a U-form which does not touch the floor, possibly with catching arms. During a stop the collected dirt particles can then be removed. The mopsweeping apparatus is transported on wheels, which preferably are adjustable in height, so that the pressure of the cloth on the floor is variable and can be adapted at  
10 desire at the type of floor, the cloth used etc. The pressing means should permanently keep the cloth on the floor. For this purpose a stationary bottom plate can be used under which the cloth is guided, comprising metal or plastic. However, the pressing means preferably is self-movable, in the shape of one or more rolls, under which the cloth  
15 is moving and which rolls themselves are rotating. The plate or rolls are further coated with a resilient porous material, which can take up the unevennesses in the floor. The pressing means also can exist of an assembly of rolls coated with resilient material which touch the floor.

In a preferable embodiment an endless belt is used which runs  
20 over two rollers, which are arranged in a frame and guide the cloth over the floor. In this embodiment more flexible action is ensured while also a favourable working surface of the cloth can be reached coupled with an acceptable breadth. The material from which the belt is composed and which further serves as coating material for the pressing  
25 plate or rolls must be inert and resistant to chemicals and oil. For this purpose various technical plastic materials are available, which are also resilient and porous. (As such are also considered foam materials like polyether foam).

The cloth preferably consists of a nonwoven which is pre-  
30 impregnated with a dust binding agent. In another embodiment a non-pre-impregnated nonwoven is provided with a dust binding agent during the use of the apparatus. Commercially available cloths are for instance RHO-THRO and NOVOLIN. The dimensions of the cloth depend on the apparatus used. When using one pressing roller there is a line contact  
35 which may be sufficient for lighter activities. The working breadth can vary from 600 mm to 1,50 m, the lower values being favourable for manual driving. The length of the cloth is not critical and depends on the

size of the rollers used. Generally, sufficient material is provided to enable use during a long time. In practice an amount of about 50 m is found favourable. With such an amount an action of five to six hours at a velocity of 9 m/hour of the cloth, especially about 10 hours at a velocity of about 5 m/hour is ensured.

The whole apparatus can be moved by mounting it on an electrically driven so-called scooter. Thus the user can, sitting on the scooter, drive it and thus treat the floor to be cleaned. One can also use human power, in which case a battery is mounted on the apparatus which provides current to the motor of the winding roller. In the scooter version the battery of the scooter serves this purpose.

The motor can be provided with a switch for stepwise actuation, possibly by means of a timing switch.

It is to be understood that, owing to the different velocities of the winding of the cloth and the moving velocity of the apparatus, a slip arises between the cloth and the floor, which of course is favourable for the cleaning power. The number of rotations of the motor can be adjustable, so that one may choose the right velocity dependant on the circumstances and that this during action possibly can be changed.

The foregoing description relates to the dry cleaning of floors. It is also possible to carry out a wet cleaning by starting from a hydrofilyc nonwoven or woven cloth which may be impregnated with a cleaning agent. The cloth used should then be a moisture and water receiving cloth, which may be impregnated with a floor cleaning agent and/or floor maintaining agent which is known, and which mostly is made somewhat thicker.

If necessary, a water tank can be mounted to the mopsweeping apparatus, which is in communication with the pressing means and delivers (additional) water during the mopping action. Preferably one starts from a dry cloth impregnated with the cleaning agent and/or the maintenance product, the water necessary being dosed from a water tank. Possibly the water tank may contain a (additional) floor cleaning agent and/or a floor maintaining agent, the moistening of the cloth taking place before or during the pressing step.

The pressing means can be made adjustably to select the pressure on the floor. However, this can also be reached by making adjustable the wheels of the apparatus, which has preference. The

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pivoting wheels are mounted on an angle line belonging to the frame which has a small angle deviation relative to the floor. During the forward movement of the apparatus, the cloth will thus be brought in contact with the floor by the pressing means while at a backwards  
5 movement the whole apparatus is tilted several millimeters from the floor. The cloth then comes free from the floor.

The apparatus will now be illustrated by means of the added figure, which is a schematic elevation of the apparatus according to the invention. In this figure a preferred embodiment is indicated wherein  
10 use is made of an endless belt running over two rollers.

In the figures 1 and 2 respectively indicate the roller with a clean cloth and the winding roller. The cloth 3 is running from roller 1 to roller 2, wherein the dotted lines 4 and 5 as well as 4' and 5' indicate the course of the cloth, i.e. of a roller just provided with  
15 cloth (4, 4') and of a practically empty roller (5, 5') with respectively an empty and a full winding roller (4', 5'). Winding roller 2 is driven by motor 6 through drive 7. Between both rollers is the endless belt 8 of porous resilient material, running about the two rollers 9. This belt is in the frame 11 of the apparatus and touches the floor  
20 with a light pressure; the cloth is running between the floor 10 and the endless belt 8; the rollers 9 are not driven.

The apparatus is further provided with a house or a cap 15. To the frame 11 wheels 12 are connected. 13 schematically indicates a hinge with which the house can be opened for replacement of the rollers.  
25 In the centre 17 and 19 indicate connection means, whereas 14 also indicates connection means. In use, after roller 1 is provided with a clean cloth and this is fixed to the take-up roller by means of the underside of the endless belt 8, the motor is started, which drives the take-up roller through the driving belt 7 with adjustable velocity. The  
30 apparatus is then moved over the floor either manually or with the use of a scooter. During action the coarser dirt assembles at the frontside of the apparatus, where a preferably U-shape strip 18 is placed, which retains this dirt; this strip can possibly be replaced by a rubber strip.

35 After the nonwoven cloth is dewinded, the rollers are removed and replaced by new ones. By means of the different setting possibi-

lities the apparatus can be adapted to the current circumstances and the type of floor in such a way that the best results are obtained.

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CLAIMS

1. Mopsweeping apparatus comprising a dust gathering cloth which is moved over the floor to be cleaned, characterized, in that it  
5 comprises a manually or motor driven housing, wherein a driven cooperating roller pair is taken up, on the one roll of which a supply of cloth is wound and on the other of which the cloth is windable, between which both rollers a pressing means is arranged, under which the cloth is retained during movement over the floor.
- 10 2. Mopsweeping apparatus according to claim 1, wherein the pressing means comprises an endless flexible belt.
3. Mopsweeping apparatus according to claim 1, wherein the pressing means consists of an assembly of rolls coated with resilient material which touch the floor.
- 15 4. Mopsweeping apparatus according to claims 1-3, wherein the take-up roller is drivable.
5. Mopsweeping apparatus according to claims 1-4, wherein the apparatus is adjusted so that the winding direction of the cloth runs in the same direction as the progressive movement of the housing.
- 20 6. Mopsweeping apparatus according to claims 1-5, wherein the apparatus is adjusted so that the cloth winding velocity is considerably lower than the moving velocity of the apparatus.
7. Mopsweeping apparatus according to claim 6, characterized in that the winding velocity is 2-15 m/hour at a moving velocity of about  
25 3-4 km/hour.
8. Mopsweeping apparatus according to claims 1-7, wherein the apparatus is moving on wheels which are adjustable in height.
9. Mopsweeping apparatus according to claims 1-8, wherein the belt consists of an inert, resilient plastic material which is porous and  
30 which can take up the unevennesses of the floor and which is further resistant to chemicals and oil.
10. Mopsweeping apparatus according to claims 1-9, wherein a nonwoven is present on the rollers and pre-impregnated with a dust binding agent.
- 35 11. Mopsweeping apparatus according to claims 1-9, wherein the cloth is moisture or water absorptive.
12. Mopsweeping apparatus according to claim 11, wherein the cloth



is impregnated with a floor cleaning agent and/or a floor maintaining agent.

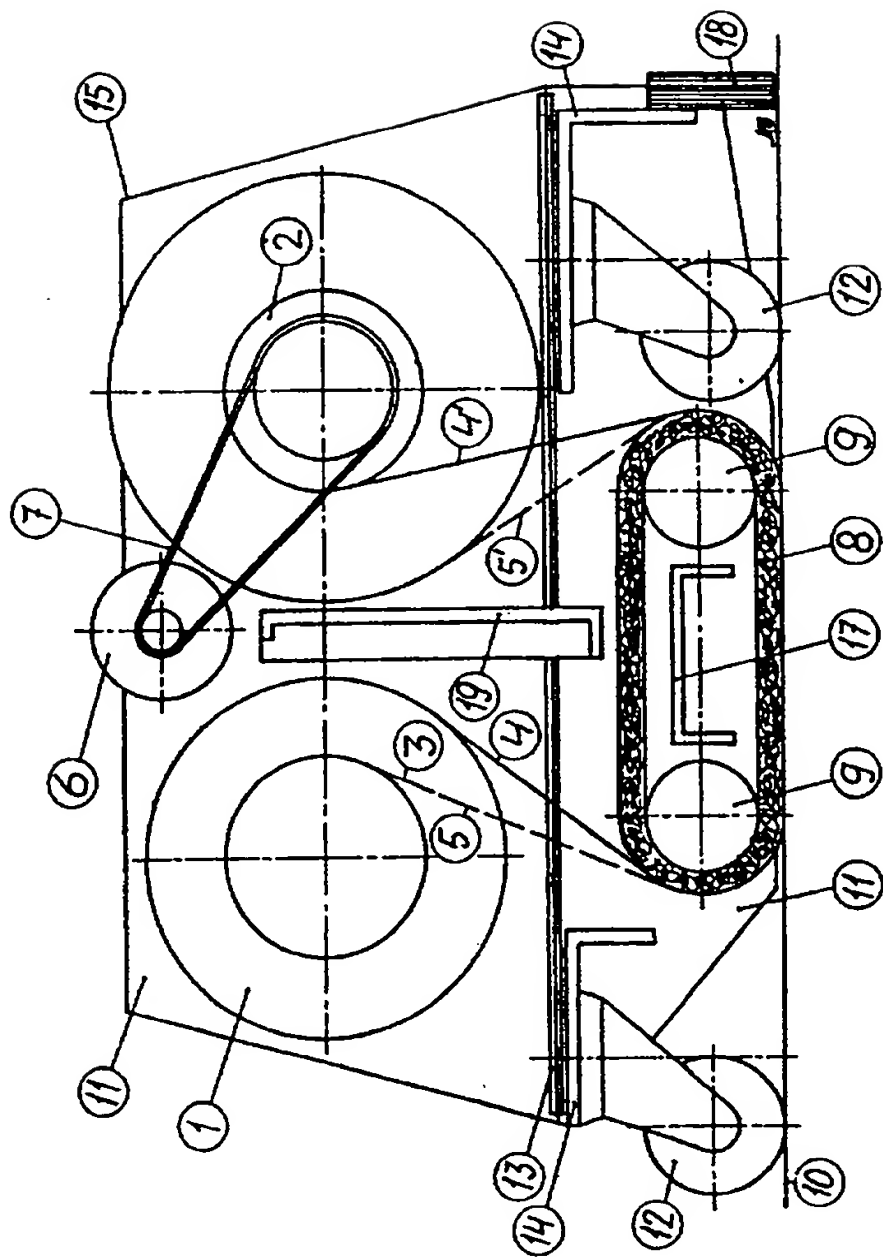
13. Mopsweeping apparatus according to claims 11-12, wherein this is provided with a water tank for moistening of the cloth.

5 14. Mopsweeping apparatus according to claim 13, wherein the water tank contains a floor cleaning agent and/or a floor maintaining agent.

15. Mopsweeping apparatus according to claims 1-4, wherein the motor of the winding roller is provided with a battery for electrical driving thereof.

10 16. Mopsweeping apparatus according to claims 1-5, wherein it is provided at the front side of a catching means for coarse dirt particles.

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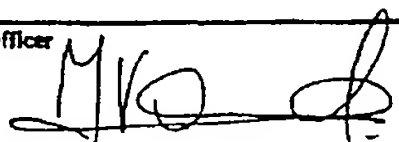


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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 91/00010

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl. 5                      A47L11/00		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
Int.Cl. 5	A47L ;              A63D	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b>		
Category <sup>10</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	DE,A,3500036 (U. SCHNOERING) 25 July 1985 see the whole document ---	1, 4, 5, 10-14
X	US,A,4562610 (J.M. DAVIS & AL) 07 January 1986 see column 4, line 66 - column 5, line 18; figures 4, 5 ---	1-5, 9, 11
X	US,A,3604037 (R.E. VARNER) 14 September 1971 see column 3, lines 56 - 75; figures 4, 5 ---	1, 4-6, 8, 9
X	US,A,3868738 (D.R. HORST & AL) 04 March 1975 see column 5, lines 3 - 31; figure 4 ---	1, 3-6, 9
X	US,A,4510642 (D.E. INGERMANN & AL) 16 April 1985 see column 3, line 4 - column 4, line 4; figure 2 --- -/-	1, 3, 4, 11
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<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
17 APRIL 1991	17. 06. 91	
International Searching Authority	Signature of Authorized Officer	
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III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	US,A,1954314 (L. HEITMAN) 12 November 1930 see column 1, line 48 - column 2, line 85; figure 2 --- ---	2

**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.**

NL 9100010  
SA 43747

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.  
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A-3500036	25-07-85	None	
US-A-4562610	07-01-86	None	
US-A-3604037	14-09-71	None	
US-A-3868738	04-03-75	JP-C- 1232188	26-09-84
		JP-A- 50054434	14-05-75
		JP-B- 59002508	19-01-84
US-A-4510642	16-04-85	JP-B- 2026516	11-06-90
		JP-A- 60153887	13-08-85
US-A-1954314		None	